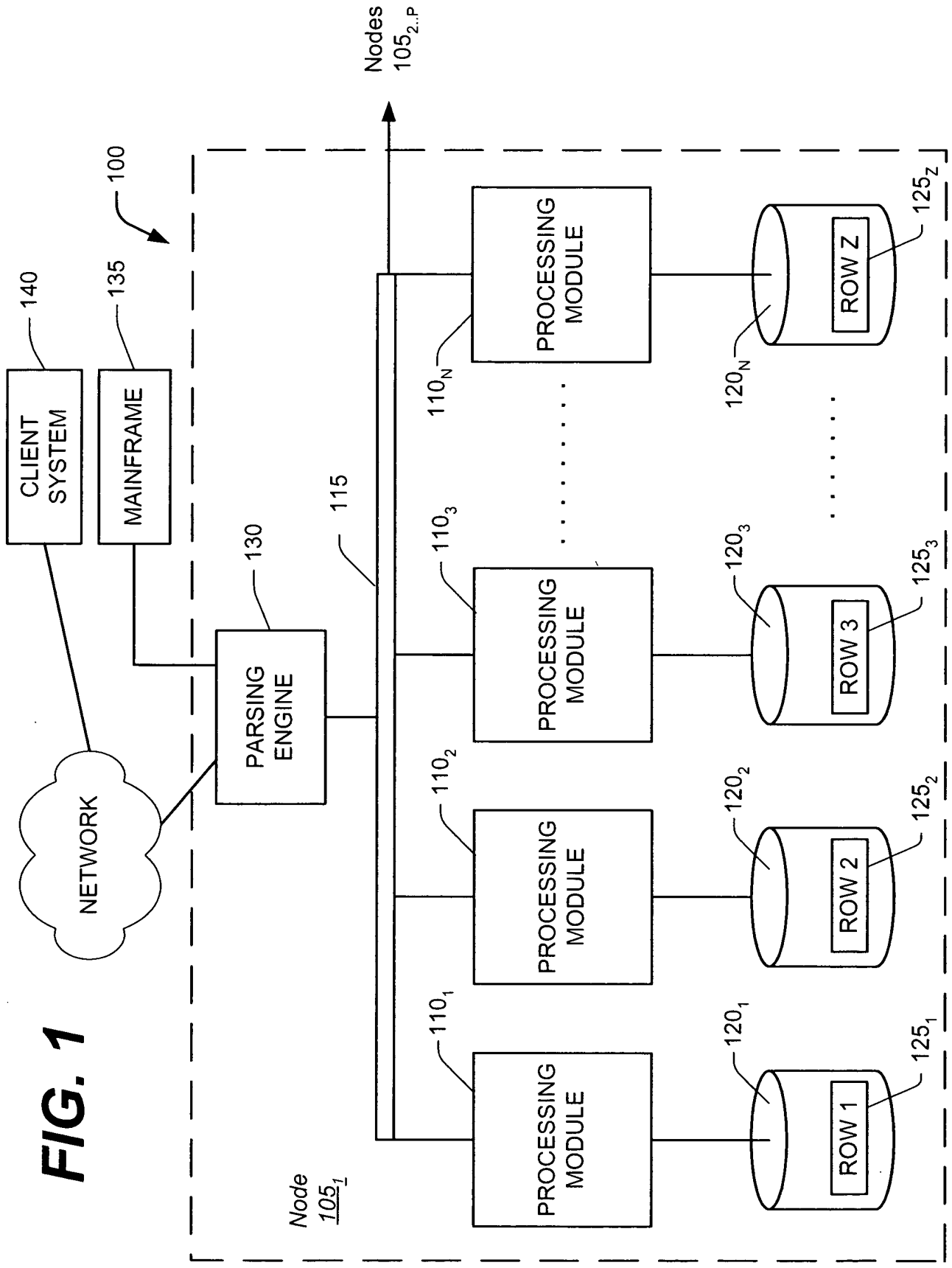
Nodes $105_{2..P}$
100
140
CLIENT SYSTEM
135
MAINFRAME
130
PARSING ENGINE
115
NETWORK
110_N
110_3
110_2
110_1
PROCESSING MODULE
PROCESSING MODULE
PROCESSING MODULE
PROCESSING MODULE
120_N
120_3
120_2
120_1
125_Z
125_3
125_2
125_1
ROW Z
ROW 3
ROW 2
ROW 1
Node 105_1

FIG. 1

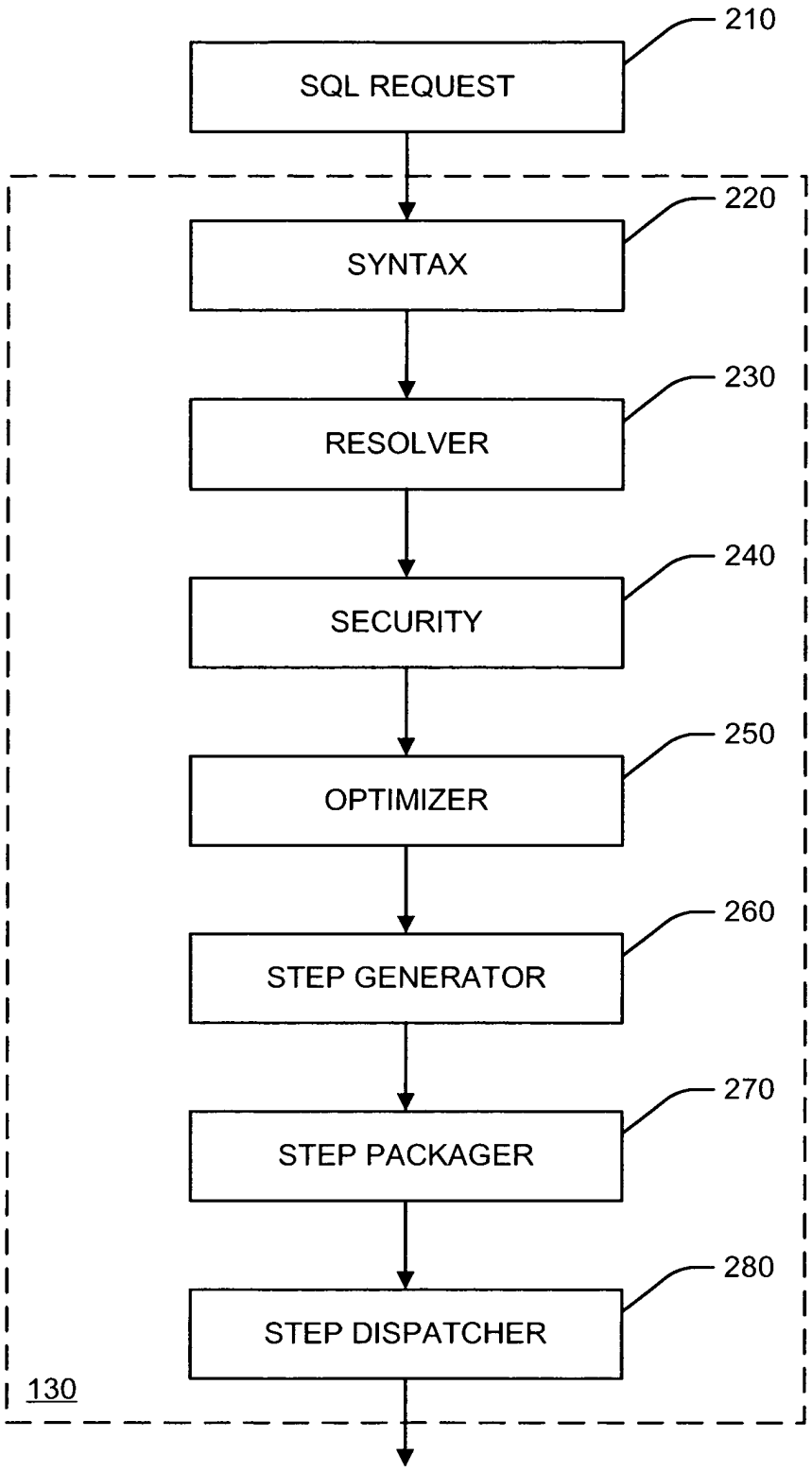
210
SQL REQUEST
220
SYNTAX
230
RESOLVER
240
SECURITY
250
OPTIMIZER
260
STEP GENERATOR
270
STEP PACKAGER
280
STEP DISPATCHER
130

FIG. 2

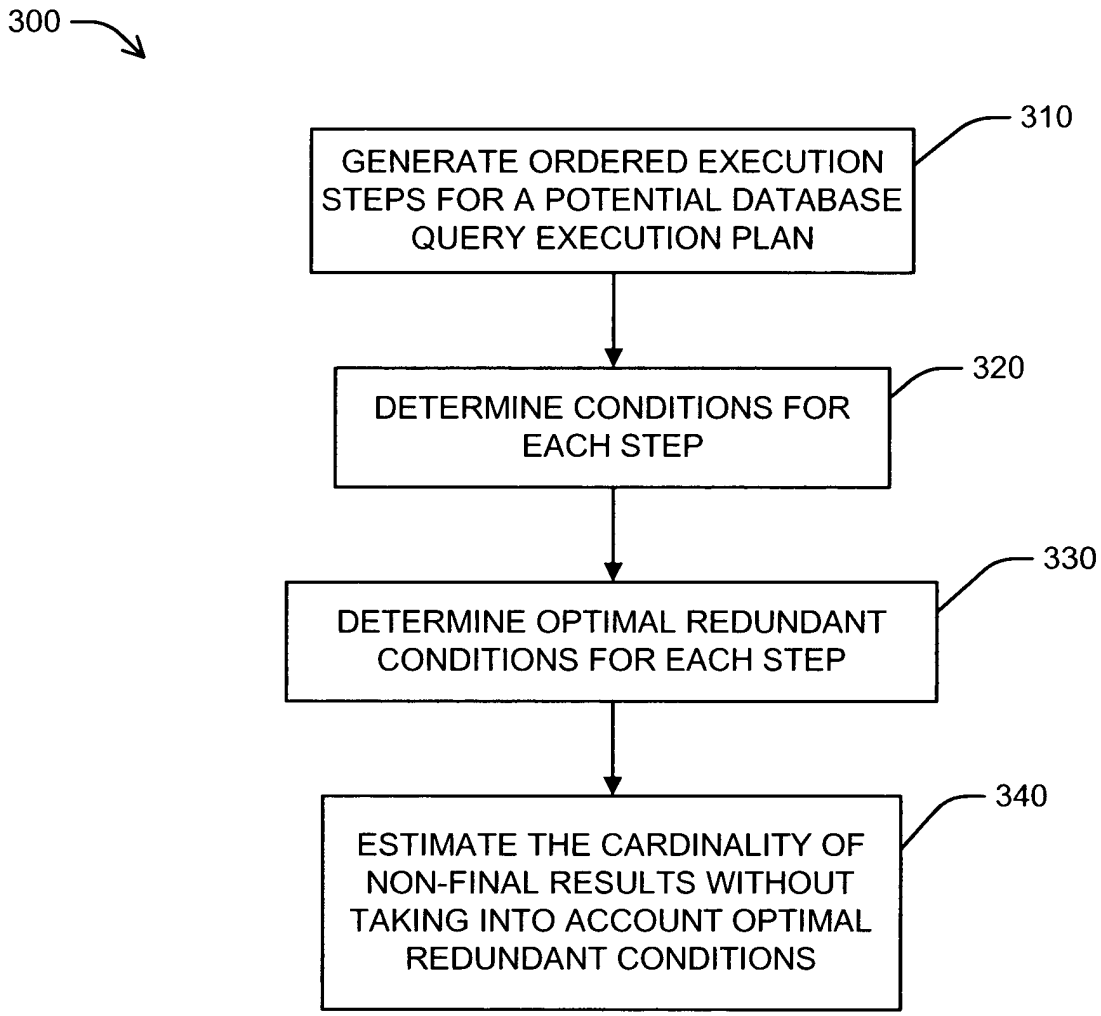
300
GENERATE ORDERED EXECUTION STEPS FOR A POTENTIAL DATABASE QUERY EXECUTION PLAN
310
DETERMINE CONDITIONS FOR EACH STEP
320
DETERMINE OPTIMAL REDUNDANT CONDITIONS FOR EACH STEP
330
ESTIMATE THE CARDINALITY OF NON-FINAL RESULTS WITHOUT TAKING INTO ACCOUNT OPTIMAL REDUNDANT CONDITIONS
340

FIG. 3

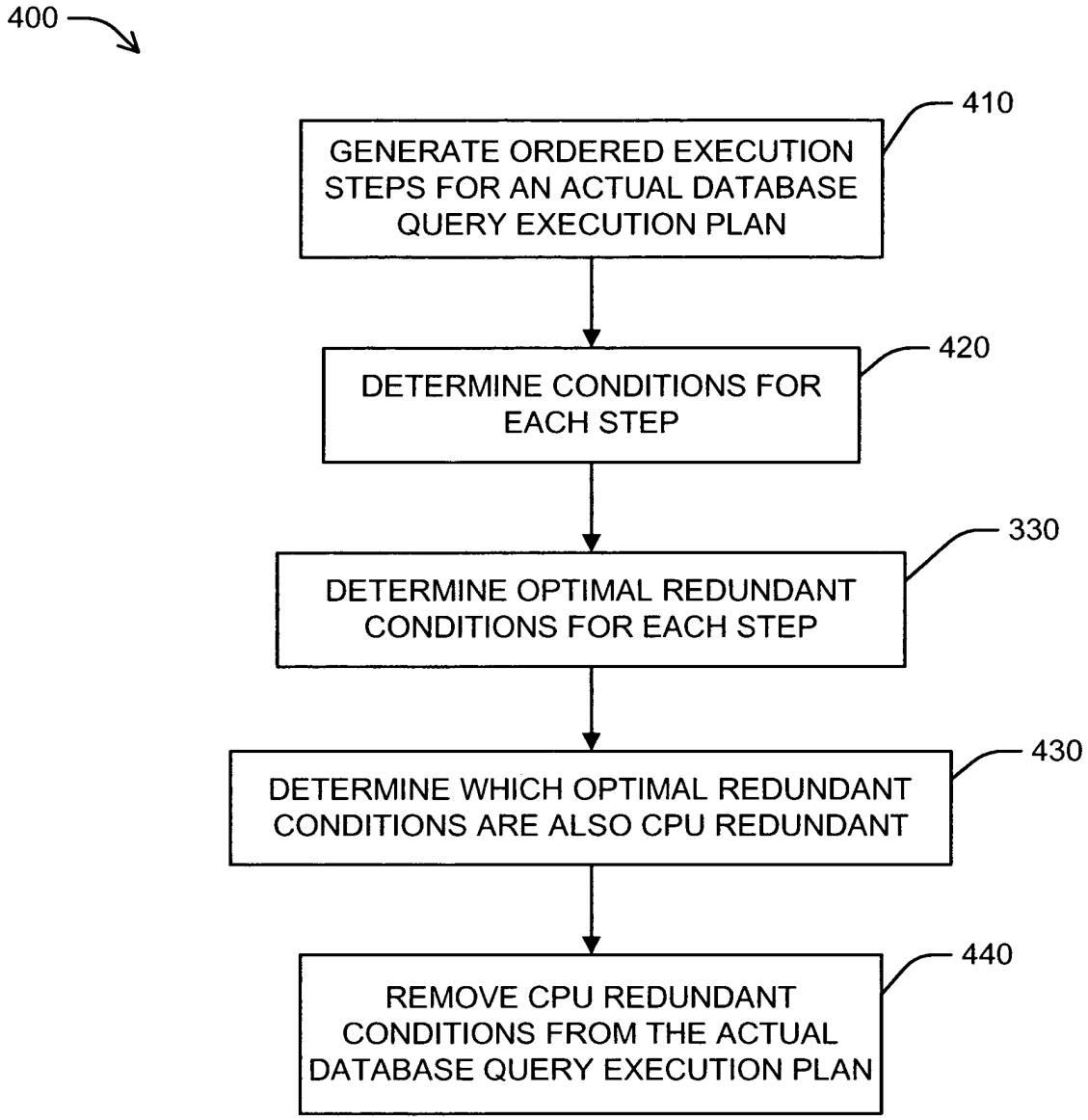
400
410
GENERATE ORDERED EXECUTION STEPS FOR AN ACTUAL DATABASE QUERY EXECUTION PLAN
420
DETERMINE CONDITIONS FOR EACH STEP
330
DETERMINE OPTIMAL REDUNDANT CONDITIONS FOR EACH STEP
430
DETERMINE WHICH OPTIMAL REDUNDANT CONDITIONS ARE ALSO CPU REDUNDANT
440
REMOVE CPU REDUNDANT CONDITIONS FROM THE ACTUAL DATABASE QUERY EXECUTION PLAN

FIG. 4

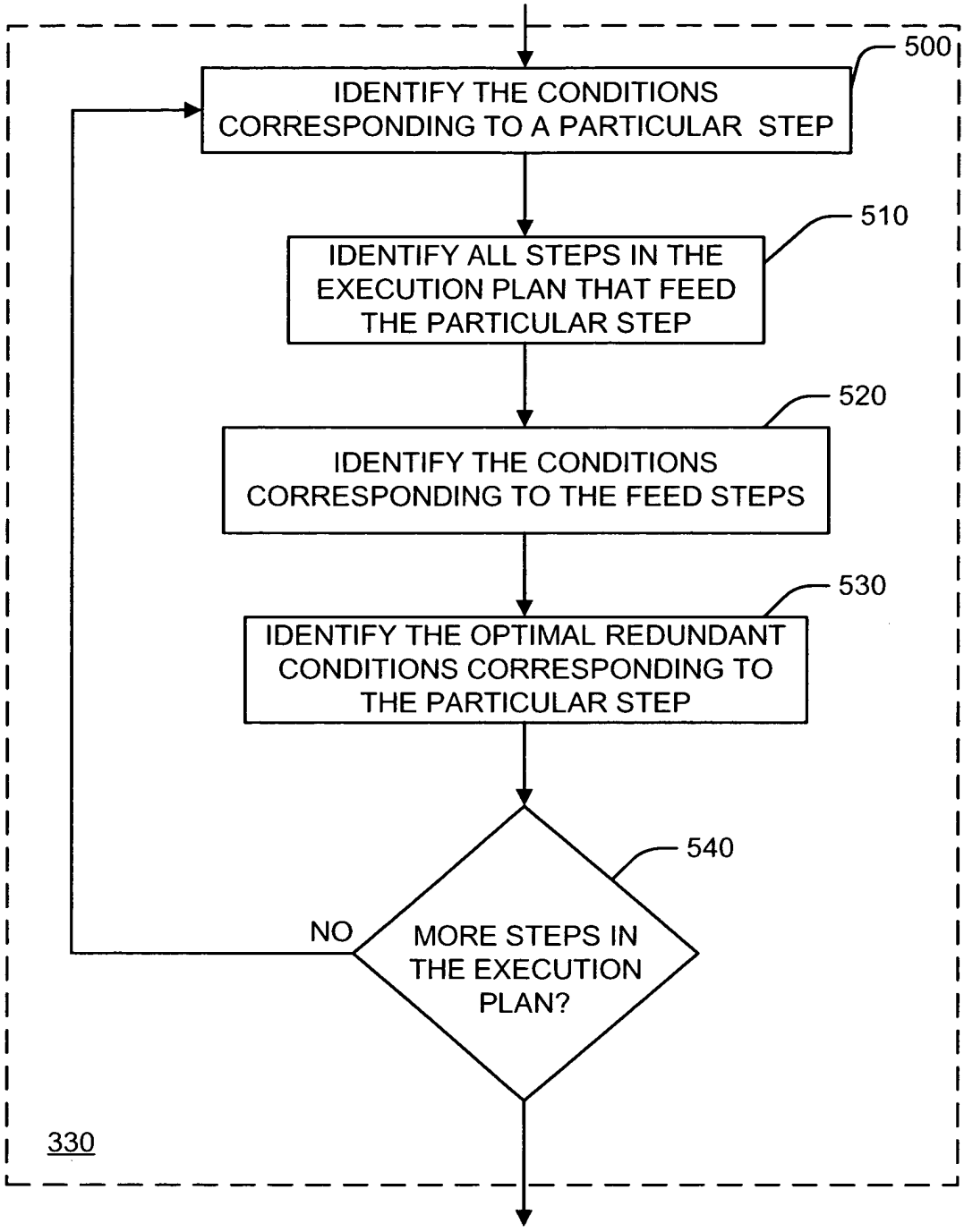
500
IDENTIFY THE CONDITIONS CORRESPONDING TO A PARTICULAR STEP
510
IDENTIFY ALL STEPS IN THE EXECUTION PLAN THAT FEED THE PARTICULAR STEP
520
IDENTIFY THE CONDITIONS CORRESPONDING TO THE FEED STEPS
530
IDENTIFY THE OPTIMAL REDUNDANT CONDITIONS CORRESPONDING TO THE PARTICULAR STEP
540
MORE STEPS IN THE EXECUTION PLAN?
NO
330

FIG. 5

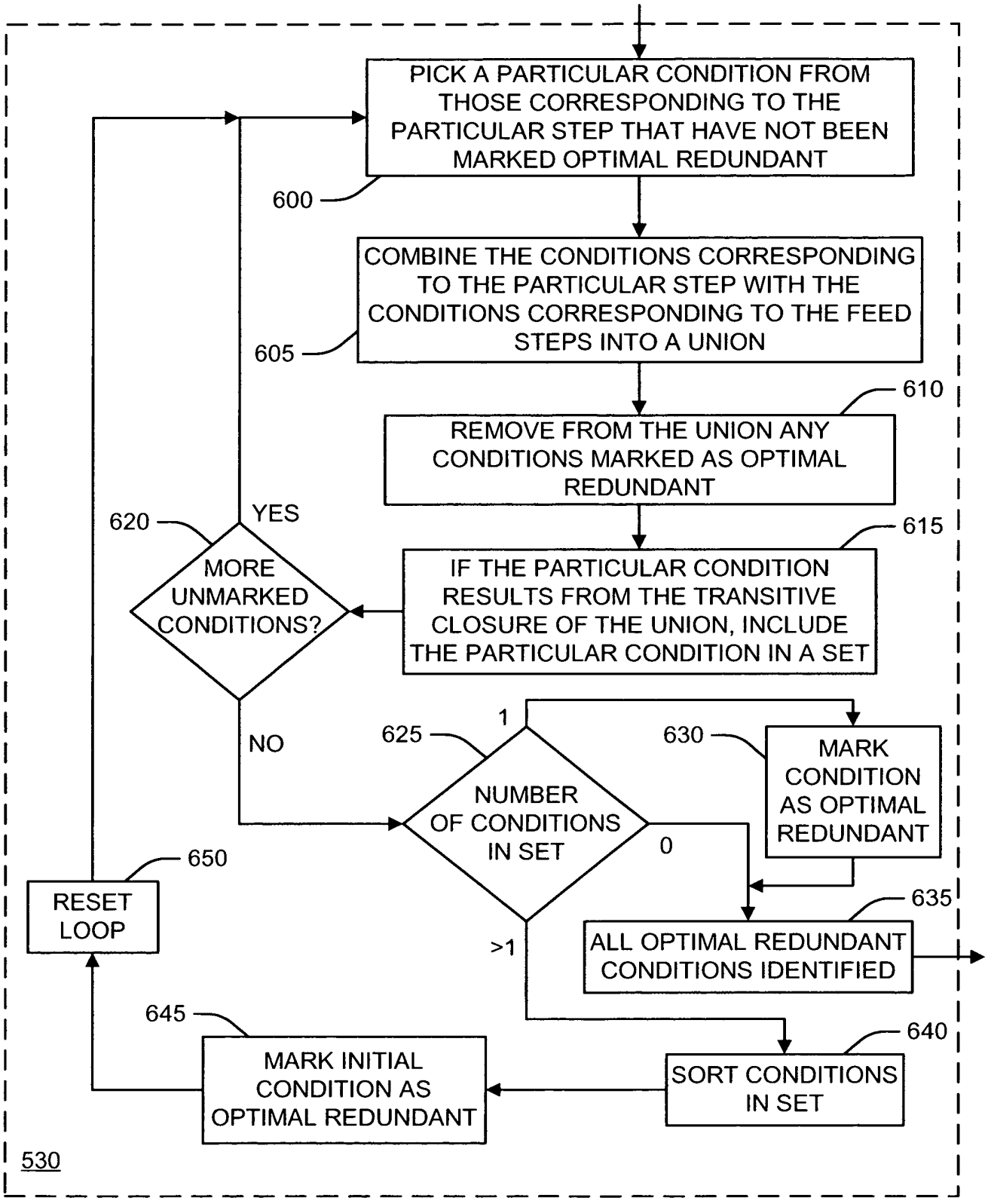
PICK A PARTICULAR CONDITION FROM THOSE CORRESPONDING TO THE PARTICULAR STEP THAT HAVE NOT BEEN MARKED OPTIMAL REDUNDANT
600
COMBINE THE CONDITIONS CORRESPONDING TO THE PARTICULAR STEP WITH THE CONDITIONS CORRESPONDING TO THE FEED STEPS INTO A UNION
605
610
REMOVE FROM THE UNION ANY CONDITIONS MARKED AS OPTIMAL REDUNDANT
615
IF THE PARTICULAR CONDITION RESULTS FROM THE TRANSITIVE CLOSURE OF THE UNION, INCLUDE THE PARTICULAR CONDITION IN A SET
620
MORE UNMARKED CONDITIONS?
YES
NO
625
NUMBER OF CONDITIONS IN SET
1
0
>1
630
MARK CONDITION AS OPTIMAL REDUNDANT
635
ALL OPTIMAL REDUNDANT CONDITIONS IDENTIFIED
640
SORT CONDITIONS IN SET
645
MARK INITIAL CONDITION AS OPTIMAL REDUNDANT
650
RESET LOOP
530

FIG. 6

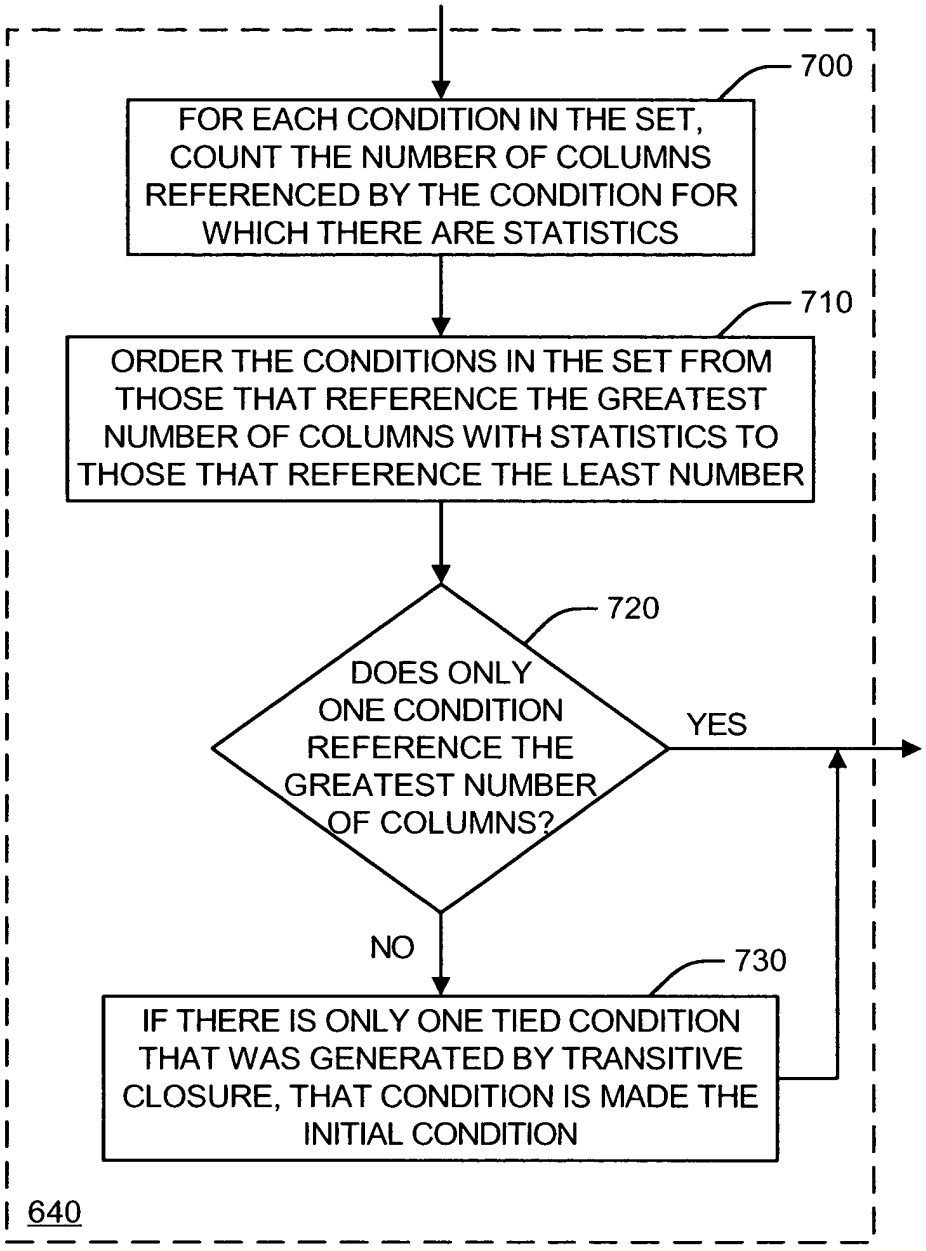
700
FOR EACH CONDITION IN THE SET, COUNT THE NUMBER OF COLUMNS REFERENCED BY THE CONDITION FOR WHICH THERE ARE STATISTICS
710
ORDER THE CONDITIONS IN THE SET FROM THOSE THAT REFERENCE THE GREATEST NUMBER OF COLUMNS WITH STATISTICS TO THOSE THAT REFERENCE THE LEAST NUMBER
720
DOES ONLY ONE CONDITION REFERENCE THE GREATEST NUMBER OF COLUMNS?
YES
NO
730
IF THERE IS ONLY ONE TIED CONDITION THAT WAS GENERATED BY TRANSITIVE CLOSURE, THAT CONDITION IS MADE THE INITIAL CONDITION
640

FIG. 7

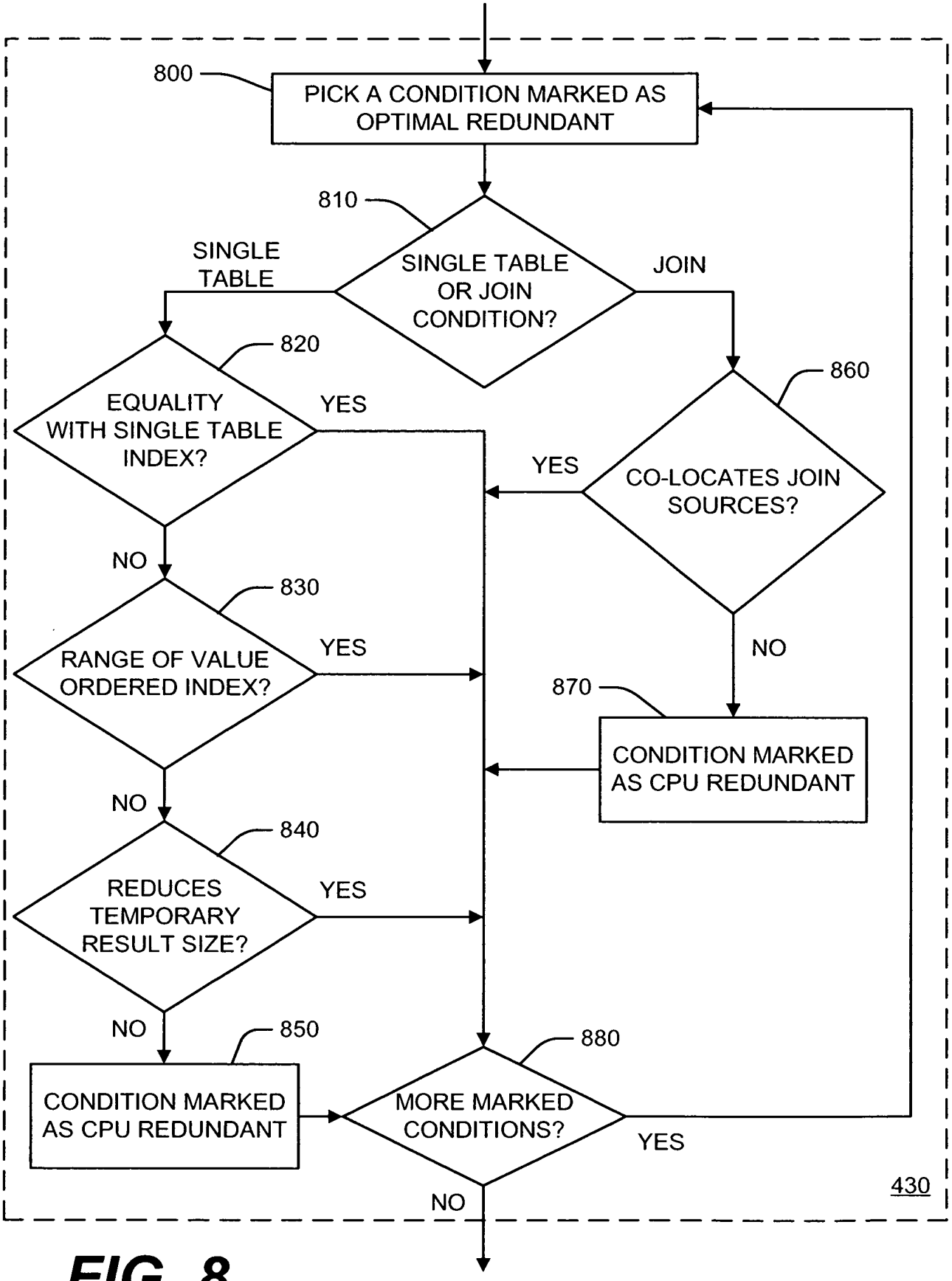
800
PICK A CONDITION MARKED AS OPTIMAL REDUNDANT
810
SINGLE TABLE OR JOIN CONDITION?
SINGLE TABLE
JOIN
820
EQUALITY WITH SINGLE TABLE INDEX?
YES
NO
860
CO-LOCATES JOIN SOURCES?
YES
NO
830
RANGE OF VALUE ORDERED INDEX?
YES
NO
870
CONDITION MARKED AS CPU REDUNDANT
840
REDUCES TEMPORARY RESULT SIZE?
YES
NO
850
CONDITION MARKED AS CPU REDUNDANT
880
MORE MARKED CONDITIONS?
YES
NO
430

FIG. 8